

## CLAIMS

What is claimed is:

- 1 1. A method comprising:
- 2 accessing graphical data for a plurality of nodes that represent a portion of a
- 3 surface of a three-dimensional object, the graphical data including coordinate
- 4 system data that indicates a coordinate system for the plurality of nodes,
- 5 appearance data that indicates an appearance for each of the plurality of nodes,
- 6 and displacement data that indicates a displacement for each of the plurality of
- 7 nodes;
- 8 creating a computer graphics representation of the portion of the surface of the
- 9 three-dimensional object by rendering the graphical data for the plurality of
- 10 nodes; and
- 11 presenting the computer graphics representation on a presentation device.
- 1 2. The method of claim 1, wherein accessing the graphical data includes
- 2 accessing appearance data that indicates an independent color for each of the
- 3 plurality of nodes and displacement data that indicates an independent
- 4 displacement for each of the plurality of nodes.
- 1 3. The method of claim 1, wherein accessing the graphical data includes
- 2 accessing coordinate system data that indicates a coordinate system that is
- 3 local to the plurality of nodes.
- 1 4. The method of claim 1:

2 wherein accessing the graphical data includes accessing node coordinate data  
3 for each of the plurality of nodes and accessing coordinate system data that  
4 implicitly creates a structural arrangement for the plurality of nodes; and

5 wherein creating includes using the node coordinate data to determine  
6 coordinates for each of the plurality of nodes in the structural arrangement.

1 5. The method of claim 4, further comprising determining coordinates for a  
2 displaced node by applying a displacement indicated in the displacement data  
3 to one of the plurality of nodes with a determined position.

1 6. The method of claim 1, wherein creating comprises:  
2 determining coordinates for a displaced node by combining a displacement  
3 associated with the displacement data with coordinates of a node of the  
4 plurality of nodes indicated by the graphical data; and  
5 projecting the coordinates of the displaced node to a two-dimensional plane  
6 corresponding to a viewing surface of the presentation device.

1 7. The method of claim 1, wherein creating comprises determining whether at  
2 least a portion of the plurality of nodes lie within a view volume by performing  
3 visibility processing including:  
4 generating a bounding solid that completely contains the plurality of nodes;  
5 rejecting the plurality of nodes if all extents of the bounding solid lie outside of  
6 extents of a view volume that is used to test for visibility; and  
7 accepting the plurality of nodes if at least some of the extents of the bounding  
8 solid lie inside of extents of the view volume.

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1 8. The method of claim 1, wherein creating includes removing a node of the  
2 plurality of nodes if the node lies outside of a view volume that distinguishes a  
3 portion that is represented in the computer graphics representation from  
4 another portion that is not represented in the computer graphics representation  
5 by clipping the portion.

1 9. The method of claim 1, wherein creating includes modifying the color value  
2 based on lighting calculations evaluated for the spatial patch, the lighting  
3 calculations including calculating a normal vector by forming a vector product  
4 of tangents associated with neighboring nodes.

1 10. The method of claim 1, wherein creating further comprises:  
2 determining four pixels of a quadrilateral that correspond to four nodes of the  
3 plurality of nodes, the quadrilateral having a quadrilateral dimension;  
4 determining an inner pixel contained within the quadrilateral by comparing the  
5 quadrilateral dimension with a pixel dimension; and  
6 interpolating a value for the inner pixel by using values for at least one of the  
7 four pixels.

- 1 11. The method of claim 1, wherein accessing graphical data includes accessing a  
2 spatial patch having a total number of nodes that is a multiple of  $2^{k+1}$ , where  
3 k is a positive integer.
- 1 12. A machine-readable medium having stored thereon data representing  
2 sequences of instructions that when executed cause a machine to:  
3  
4 access graphical data for a plurality of nodes that represent a portion of a  
5 surface of a three-dimensional object, the graphical data including coordinate  
6 system data that indicates a coordinate system for the plurality of nodes,  
7 appearance data that indicates an appearance for each of the plurality of nodes,  
8 and displacement data that indicates a displacement for each of the plurality of  
9 nodes;  
10  
11 determine a plurality of presentation device coordinates that correspond to the  
12 plurality of nodes by processing the graphical data including determining  
13 coordinates of a displaced node by combining coordinates for a node with a  
displacement corresponding to the node; and  
store the plurality of presentation device coordinates in a memory.
- 1 13. The machine-readable medium of claim 12, wherein the instructions to access  
2 further comprise instructions causing the machine to access a spatial patch  
3 having the graphical data, the spatial patch containing graphical data for a total  
4 number of nodes that is a multiple of  $2^{k+1}$  nodes, where k is a positive  
5 integer.

1 14. The machine-readable medium of claim 12, wherein the instructions to access  
2 graphical data further comprise instructions causing the machine to access  
3 appearance data that indicates an independent color for each of at least nine  
4 nodes and displacement data that indicates an independent displacement for  
5 each of the at least nine nodes.

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1 15. A machine-readable data structure stored on a machine-readable medium,  
2 comprising:  
3 color data that indicates color values of a plurality of nodes associated with a  
4 portion of a surface of an object;  
5 displacement data that indicates a displacement distance for each of the  
6 plurality of nodes; and  
7 coordinate system data that indicates a coordinate system of the plurality of  
8 nodes.

1 16. The machine-readable data structure of claim 15, wherein the machine-  
2 readable data structure comprises displacement data for each of at least nine  
3 points, the displacement data indicating independent and irregular  
4 displacements that vary in both magnitude and gradient for each of the at least  
5 nine points.

1 17. The machine-readable data structure of claim 15, wherein the coordinate  
2 system data indicates a plane and wherein the displacement data indicates a  
3 displacement distance that is relative to the plane.

1 18. A system comprising:

2 a memory having a spatial patch stored thereon, the spatial patch comprising  
3 color data that indicates a color value associated with at least a portion of the  
4 spatial patch, displacement data that indicates a displacement distance for at  
5 least a portion of the spatial patch, and coordinate system data that indicates a  
6 coordinate system for the spatial patch;

7 a spatial patch rendering unit to create computer graphics by rendering the  
8 spatial patch; and

9 a display device to display at least the computer graphics.

19. The system of claim 18, further comprising:

2 a second spatial patch; and

3 a second spatial patch rendering unit to create computer graphics by rendering  
4 the second spatial patch simultaneously with the rendering of the spatial patch.

1 20. The system of claim 18, wherein the spatial patch comprises color data that  
2 indicates a color value for each of a plurality of nodes associated with a surface  
3 portion of a graphical object, and wherein the displacement data indicates an  
4 independent and irregular displacement distance that varies in both magnitude  
5 and gradient for each of the plurality of nodes.

1 21. The system of claim 18, wherein the spatial patch comprises color data and  
2 displacement data for each of a total plurality of nodes, the total plurality of  
3 nodes having a total number of nodes that is a multiple of  $2^{k+1}$ , where k is a  
4 positive integer.

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1. The first step is to identify the problem or question that needs to be addressed. This involves understanding the context and the specific requirements of the task.